

1.3: Write Algebraic Expressions

Goals: *Translate verbal phrases into algebraic expressions by identifying key words and phrases

*Use and find unit rates

*REMEMBER THAT AN EXRESSION....Does NOT have an equals sign!

Key Words

Addition Sum Increased By Plus More than Total	Subtraction Difference Less Minus Less than* Decreased by
Multiplication Times Of Product Each Multiply by Per	Division Quotient Divide by Divided into

Translate the following verbal phrases into algebraic expressions:

Ex: 5 more than x

$$5 + x$$

Ex: The product of 3 and a number y

$$3y$$

Ex: The difference of 7 and b

$$7 - b$$

Ex: 4 less a number z

$$4 - z$$

Ex: t less than 40

$$40 - t$$

Grouping: If there is more than one key word or phrase used, or the word “quantity” is used, you need to use parenthesis to group the operation that needs to occur first.

Ex: 4 more than the quantity 6 times a number n

$$4 + (6n)$$

*As soon as “more than” happens, add. As soon as the second key word is underlined (*Times) use parenthesis. In this particular problem it would be the same with or without parenthesis, but always use them to be safe.

Ex: The difference of 3 and the product of 5 and x

$$3 - (5x)$$

Ex: 7 less than twice a number b

$$(2b) - 7$$

Ex: The difference of 22 and the square of a number m

$$22 - (m^2)$$

Ex: The quotient when the quantity 10 plus a number x is divided by 2

$$\frac{10+x}{2}$$

Ex: 8 times the sum of 4 and a number.

$$8(4 + x)$$

Ex: 12 decreased by a number x

$$12 - x$$

Ex: The quotient of the square of a number m and 5

$$\frac{m^2}{5}$$

Ex: A piece of ribbon l feet long is cut from a ribbon 8 feet long. Write an expression for the length, in feet, of the remaining piece. (Draw a picture to help)

$$8 - l$$



Ex: You work with 5 other people at an ice cream stand. All the workers put their tips in a jar and share their tips equally at the end of the day. Write an expression to represent the total amount of money each worker will receive in tips at the end of the day.

Let t = amount of money made in tips

$$\frac{t}{6}$$

*There are six people working if you and five others



Ex: You and 4 friends meet to have dinner at a restaurant. Everyone decides to order the nightly special. Write an expression to represent the total cost of the meal.

s = cost of nightly special

$$5s$$

Rates and Unit Rates:

Rate: A fraction that compares two quantities measured in different units

Unit Rate: A rate with a denominator of 1

Finding a unit rate:

Ex: A car travels 110 miles in 2 hours

Important Factors

- How do you set up this rate? Why?

$$\frac{110 \text{ miles}}{2 \text{ hours}} = \frac{55 \text{ miles}}{1 \text{ hour}}$$

Divide top and bottom by
2 to make the denominator
1.

What if the sentence read:

“It takes a car 2 hours to travel 110 miles”

Would you change the way you set up the rate?

2 questions to help you decide how to set it up:

- How many hours does it take to go 1 mile?

Or

- How many miles can you go in 1 hour?

*Since a UNIT RATE has a denominator of 1, then the denominator is the quantity with the 1 attached.

The question that makes the most sense to ask is “*How many miles can you go in 1 hour?*” The 1 is attached to the hours. When creating a unit rate, the 1 needs to show up in the denominator, so hours is the denominator.

Use the given information to find a unit rate (round to the nearest cent):

Ex: A 16-ounce box of cereal costs \$2.99

$$\frac{\$2.99}{16 \text{ oz}} = \frac{\$0.19}{1 \text{ oz}}$$

\$0.19 per ounce

Ex: 9 gallons of gas costs \$29.70

$$\frac{\$29.70}{9 \text{ gallons}} = \frac{\$3.30}{1 \text{ gallon}}$$

\$3.30 per gallon

Ex: Your basic monthly charge for cell-phone service is \$30, which includes the first 300 minutes. You pay a fee for each extra minute you use. One month you paid \$3.75 for 15 extra minutes.

- a) Write an expression to represent the total cost of your monthly bill for any number of extra minutes.

$$\frac{\$3.75}{15 \text{ minutes}} = \frac{\$0.25}{1 \text{ minute}} \text{ Since it's \$0.25 per minute, let } x = \text{the number of extra minutes used each month.}$$

$$y = 30 + 0.25x$$

- b) Find your total bill if you use 22 extra minutes.

$$y = 30 + 0.25(22)$$

$$y = \$35.50$$

What do you need to know before you can figure out your new monthly bill? **Cost per extra minute**

How can you find it? **Find the unit rate**

Ex: You have a membership at a local ski club. The membership costs you \$40 per month, which includes 10 lift tickets. You must pay a fee for each lift ticket after the tenth one. Two months ago you paid \$13.50 for 3 extra lift tickets.

- a) Write an expression to represent the total cost for any number of extra lift tickets.

$$\frac{\$13.50}{3 \text{ passes}} = \frac{\$4.50}{1 \text{ pass}} \quad \text{Let } x = \text{the number of extra passes you need and } y = \text{the total cost you pay}$$

$$y = 4.50x + 40$$

- b) Find your total cost for this month if you bought 7 extra lift tickets.

$$y = 4.5(7) + 40$$

$$y = \$71.50$$